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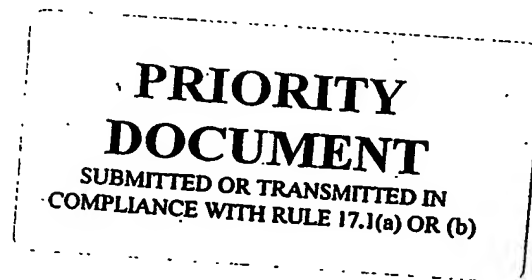
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Retaining element

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RETAINING ELEMENT

The present invention relates to an elongate retaining element for building sheets having as seen in cross section perpendicular to its direction of elongation, a head part
5 for engaging at least one building sheet.

Such an elongate retaining element is known from GB-2167101-A, which discloses a retaining element having a head part and a base part connected by a connecting flange. The head part engages with the free end of at least one building sheet, which is at least partially curved over the head part of the retaining element. The
10 head part is substantially triangular in cross section and has rounded vertices that engage with the building sheet.

A disadvantage of such prior art retaining elements is that movement of the building sheets over the retaining element, caused by e.g. thermal expansion or wind suction, generates unpleasant noise.

15 One proposed solution to the problem of noise is proposed in GB-342933-A in which the head part of the retaining element is provided with a solid coating comprising an organic powder coating.

An object of the present invention is to provide an improved retaining element.

20 A further preferred object of the present invention is to provide a retaining element that reduces the noise generated when building sheets slide over the head part of the retaining element.

One or both of these objects are obtained by a retaining element wherein the head part comprises one or more movable elements.

25 The movable elements allow the engageable building sheet to slide over the head part. The presence of movable elements in the head part significantly reduces the friction between the head part and the engageable building sheet enabling the building sheet to slide easily over the head part of the retaining element without generating significant noise. Wearing of the building sheet and the head part of the retaining element and resultant dust formation is also reduced. A further advantage is that
30 reduced friction between the head part and the building sheet reduces the mechanical load on the join with a support structure. A high mechanical load on the retaining element is particularly undesirable where the support structure to which a retaining element is attached is less robust such as for example, insulating glass wool or foam

glass. By reducing the mechanical loading to which the retaining element is subjected the present invention reduces the risk of the retaining element failing.

The movable elements are preferably rotatable to facilitate the sliding of a building sheet over the head part. The movable elements are preferably rotationally symmetrical and can freely and smoothly rotate reducing the chance of noise generation as a building sheet slides over the head part of the retaining element. The movable elements are most preferably spherical and can thus rotate in all orientations further reducing the chance of noise generation. The spherical movable elements preferably have a diameter of 1mm to 10mm to ensure they can be easily mounted on the head part and effectively facilitate the sliding of a building sheet over the head part of the retaining element.

The head part of the retaining element is preferably substantially triangular in cross section and preferably has a movable element positioned at one or more vertices of the triangle. The movable elements are therefore positioned on the head part at the points where a building sheet contacts the head part and are thus optimally positioned to reduce the friction between the head part and a building sheet sliding over the head part.

The movable elements are preferably made from metal, plastic or ceramic or a combination of these. Metal and ceramic are both hard and resistant to wearing offering good durability whilst plastic such as PTFE (polytetrafluoroethylene) is easily formable and resistant to temperature variations. The metal used is more preferably sinter metal e.g. sinter bronze for increased hardness and wear resistance.

The head part may comprise one or more mountings in which one or more movable elements are mounted. The mountings preferably extend in the direction of elongation of the retaining element. Of course the head part may comprise more than one mounting and each mounting may contain multiple movable elements. The mountings facilitate assembly of a retaining element, as the movable elements do not have to be individually mounted to the retaining element.

The retaining element preferably comprises a base part and a connecting flange connecting the base part and the head part wherein the head part, excluding the mountings and movable elements, the base part and connecting flange are made from metal which can be extrusion formed or a combination of metal and plastic which provides an insulating barrier between the interior of a roofing or cladding assembly

and the building sheets e. g as known from EP-1236840- A1 (optionally incorporated herein by reference). The head part, excluding the mountings and movable elements, the base part and connecting flange are preferably formed from extruded aluminium.

The retaining element known from WO-98/53158 (optionally incorporated herein
5 by reference) may be provided with a head part as proposed in the present invention.

A further aspect of the invention relates to an assembly for roofing a building or cladding e.g. the façade of a building comprising one or more elongate retaining elements as described above and having the advantages as set out above.

A further aspect of the invention relates to a mounting, in which movable
10 elements are mountable, for use in the elongate retaining element according to the present invention.

The present invention is described further by way of example with reference to the accompanying schematic drawings in which:

Fig.1 shows a cross section perpendicular to the direction of elongation through a
15 retaining element according to the invention;

Fig. 2 shows a side view of a retaining element according to the invention;

Fig. 3 shows a retaining element according to the invention engaging with building sheets;

Fig. 4 shows a further retaining element according to the invention engaging with
20 building sheets;

Fig. 5A to 5C show a further retaining element according to the invention in three different directions;

Fig. 6 show a mounting for holding bearings as used in the retaining element of Fig. 5;

25 Fig. 7A and 7B show a further retaining element according to the invention from two different directions;

Fig. 8 shows a further retaining element according to the invention as seen in its direction of elongation.

Fig. 1 shows a retaining element comprising a head part 1, a connecting flange 2
30 and a base part 3 where the connecting flange 2 connects the base part 3 to the head part 1. The head part 1 of the retaining element is preferably substantially triangular and preferably comprises mountings 5 into which movable elements 4 in the form of ball bearings are mounted. The movable elements could also be for example cylindrical or

rugby-ball shaped. The movable elements may be made from metal, in particular sinter metal such as sinter bronze, plastic or ceramic. The mountings 5 may be attached by snap-fitting or may be fixed with adhesive or other fixing means. The mountings may be made of plastic which provides an insulation layer between the building sheets and the connecting flange and base parts of the retaining element and also resiliently retains the movable elements. The mountings may also be made from metal for durability. The head part of the retaining element, excluding the mountings and movable elements, the connecting flange and base parts of the retaining element are preferably made from metal or a combination of metal and plastic. The head part of the retaining element, excluding the mountings and movable elements, the connecting flange and base parts of the retaining element are preferably made from extruded aluminium.

Fig. 2 shows a side view of a retaining element according to the invention. The numbering is in accordance with Fig. 1 as described above. It can be seen that the mountings 5 in which the movable elements 4 are mounted preferably extend in the direction of elongation of the retaining element.

Fig. 3 shows a retaining element according to the invention and numbered in accordance with Fig. 1 as described above. The head part of the retaining element is substantially triangular in cross section. The retaining element is engaging with building sheets 6 and 7. Building sheets 6 and 7 have upstanding flanges 6a and 7a respectively, which end in curved portions 6b and 7b that curve around head portion 1 of the retaining element. The base part of the retaining element is mounted on a support structure 8 which can be for example a roof girder.

Fig. 4 shows a retaining element according to the invention and numbered in accordance with figures 1 and 3 as described above. The head part of the retaining element is substantially triangular in cross section and comprises cut away portions 10,11 adjacent the connecting flange 2 which form grooves extending along the direction of elongation of the retaining element. The retaining element is engaging with building sheets 6 and 7 which have upstanding flanges 6a and 7a respectively. The upstanding flanges end in curved portions 6b and 7b that curve around head portion 1 of the retaining element. The curved portions 6b and 7b of the building sheets can extend into the cut-away portions or grooves 10 and 11 which improve the engagement of the head part with the building sheets. The base part of the retaining element is mounted on a support structure 8 which can be for example a roof girder.

The retaining elements can of course also be mounted horizontally for example as part of a wall cladding or façade assembly for a building, or at other angles from the vertical.

Fig. 5A shows another embodiment of the retaining element according to the invention as seen in the direction of elongation. In the head part 1 a mounting or holder is provided holding movable elements 4, preferably bearings and more preferably ball bearings, each bearing is located at the vertices of a triangle. The mounting or holder is preferably made of one single element, see Fig. 6. Fig. 5C shows a top view of the retaining element of Fig. 5A, in which there are providing three mountings each having three ball bearings 4. The mountings (not shown) are preferably arranged at regular intervals. In this embodiment three mountings are shown, but it will be apparent to the skilled person that the retaining element should have one or more of such mountings with bearings, e.g. one, two, three, four, or more of the mountings could be inserted into the head part 1 of the retaining element. Each mounting with the bearings is located in the head part of the retaining element and is arranged in grooves or slots in the head part of the retaining element. Such grooves are preferably substantially perpendicular to the direction of elongation of the retaining element. Where the retaining element is made from an extrusion, the grooves are preferably cut or machined into the head part of the retaining element. The mountings are preferably coupled to the retaining element to prevent sliding out in service from the head part. Such a coupling could be achieved using locking means 11, for example a lock nut, applied through the head part of the retaining element. Fig. 5B shows a side view of the retaining element of Fig. 5A.

Fig. 6 shows schematically a mounting 12 or holder which can be used in the retaining element of Fig. 5. The bearings are fitted into the mounting in recesses at the vertices. Preferably there is provided a central bore for accommodating a lock for coupling the mounting in the head part of the retaining element. Such a mounting 12 is preferably made from a metal such as an extruded aluminium alloy or from a plastic material, although other suitable materials may be used.

Fig. 7A shows in cross-section another retaining element according to the invention whereby multiple bearings are arranged inside of the head part of the retaining element such that an upper-section of the head part can slide in its direction of elongation over the bearings with respect to the lower-section of the head part which

lower-section is connected to the connecting flange 2 and the base part 3. Fig.7B shows a side view of the retaining element showing the arrangement of multiple bearings 4 in the head part of the retaining element.

Fig. 8 shows in cross-section another retaining element according to the invention whereby the head part can slide in the direction of elongation with respect to the connecting flange 2. Preferably the head part comprises of two sections, viz. an upper-section and a lower-section. Preferably the upper-section of the head part encloses the lower-section of the head part. Both or either the upper-section or the lower-section is made from a bearing alloy, e.g. an aluminium bearing alloy known in the art, to avoid any friction between the upper-section and lower-section of the head part when sliding one over the other. Alternatively at an appropriate location either in the upper-section facing the lower-section or in the lower-section facing the upper-section, there is provided one or more pins or sticks of a bearing alloy or other material having a low coefficient of friction with respect to the material of the retaining element.

CLAIMS

1. Elongate retaining element for building sheets, having as seen in cross section perpendicular to its direction of elongation, a head part for engaging at least one building sheet, characterised in that the head part comprises one or more movable elements.
6
2. Elongate retaining element according to claim 1, wherein the movable elements are rotatable.
10
3. Elongate retaining element according to claim 2, wherein the movable elements are rotationally symmetrical.
4. Elongate retaining element according to claim 3, wherein the movable elements are spherical.
15
5. Elongate retaining element according to claim 4, wherein the movable elements are of diameter in the range of 1mm to 10mm.
- 20 6. Elongate retaining element according to any one of the preceding claims 1 to 5 wherein the head part is substantially triangular in cross section and a movable element is positioned at one or more vertices of the triangle.
- 25 7. Elongate retaining element according to any one of the preceding claims 1 to 6 wherein the movable elements are made from metal, plastic or ceramic or combinations thereof.
8. Elongate retaining element according to any one of preceding claims 1 to 7, wherein the head part comprises one or more mountings in which the movable elements are mounted.
30
9. Elongate retaining element according to any one of preceding claims 1 to 8, wherein the retaining element comprises a base part and a connecting flange

8

connecting the base part and the head part wherein the head part, excluding the mountings and movable elements, the base part and connecting flange are made from metal or a combination of metal and plastic.

- 5 10. Assembly for roofing a building or forming a building façade comprising one or more elongate retaining elements according to any one of the preceding claims.
11. Mounting, in which movable elements are mountable, for use in the elongate retaining element according to claim 8.

ABSTRACT

Elongate retaining element for building sheets, having as seen in cross section perpendicular to its direction of elongation, a head part for engaging at least one building sheet, wherein the head part comprises one or more movable elements.

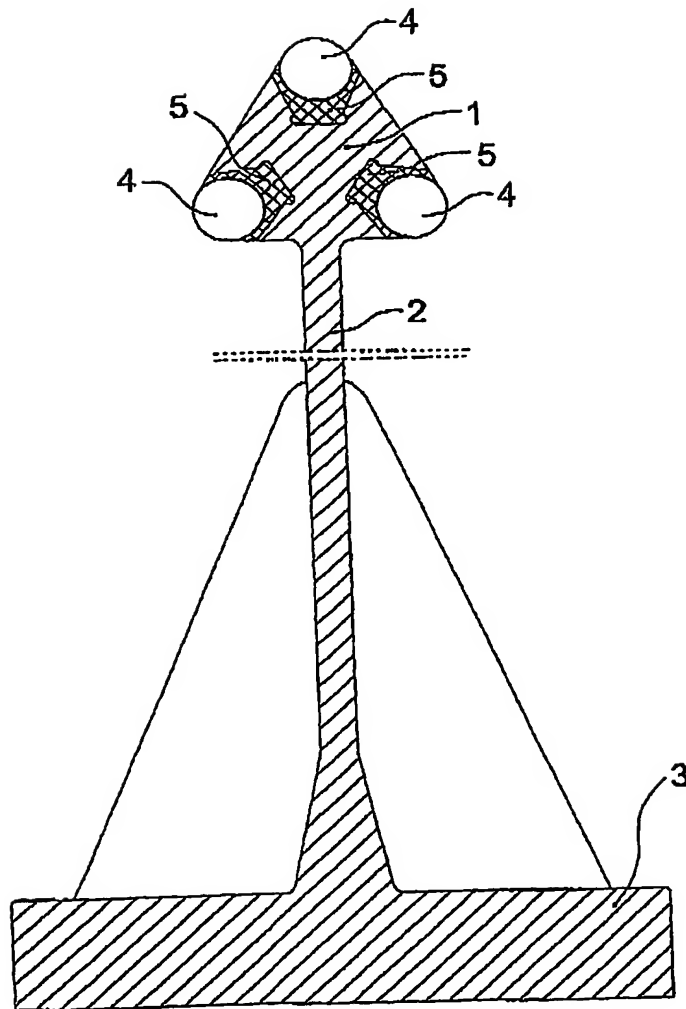


FIG. 1

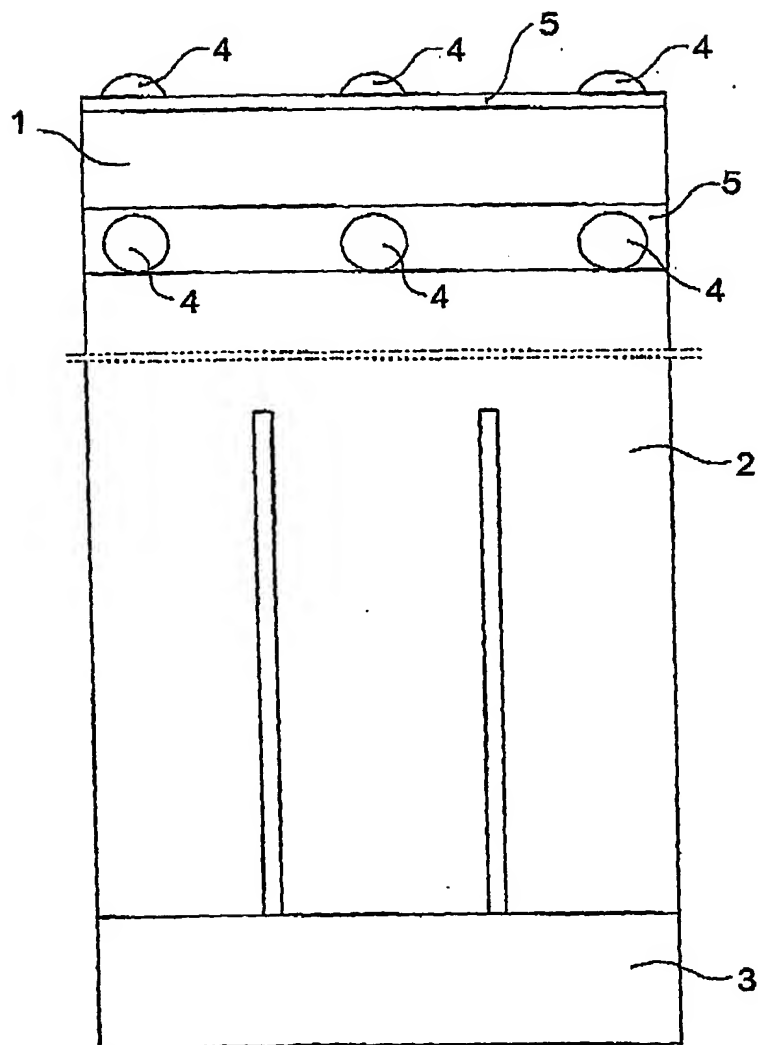


FIG. 2

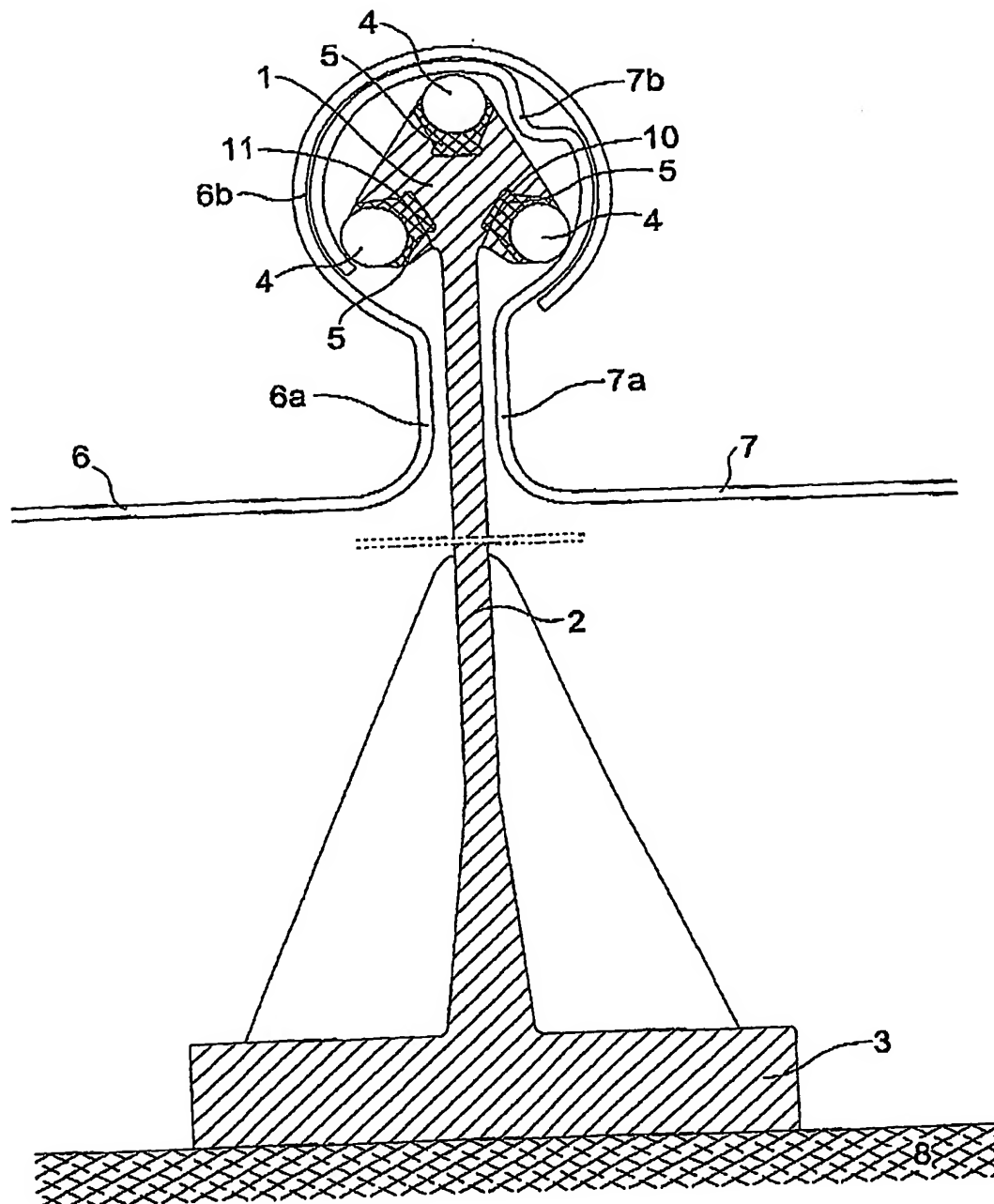


FIG. 3

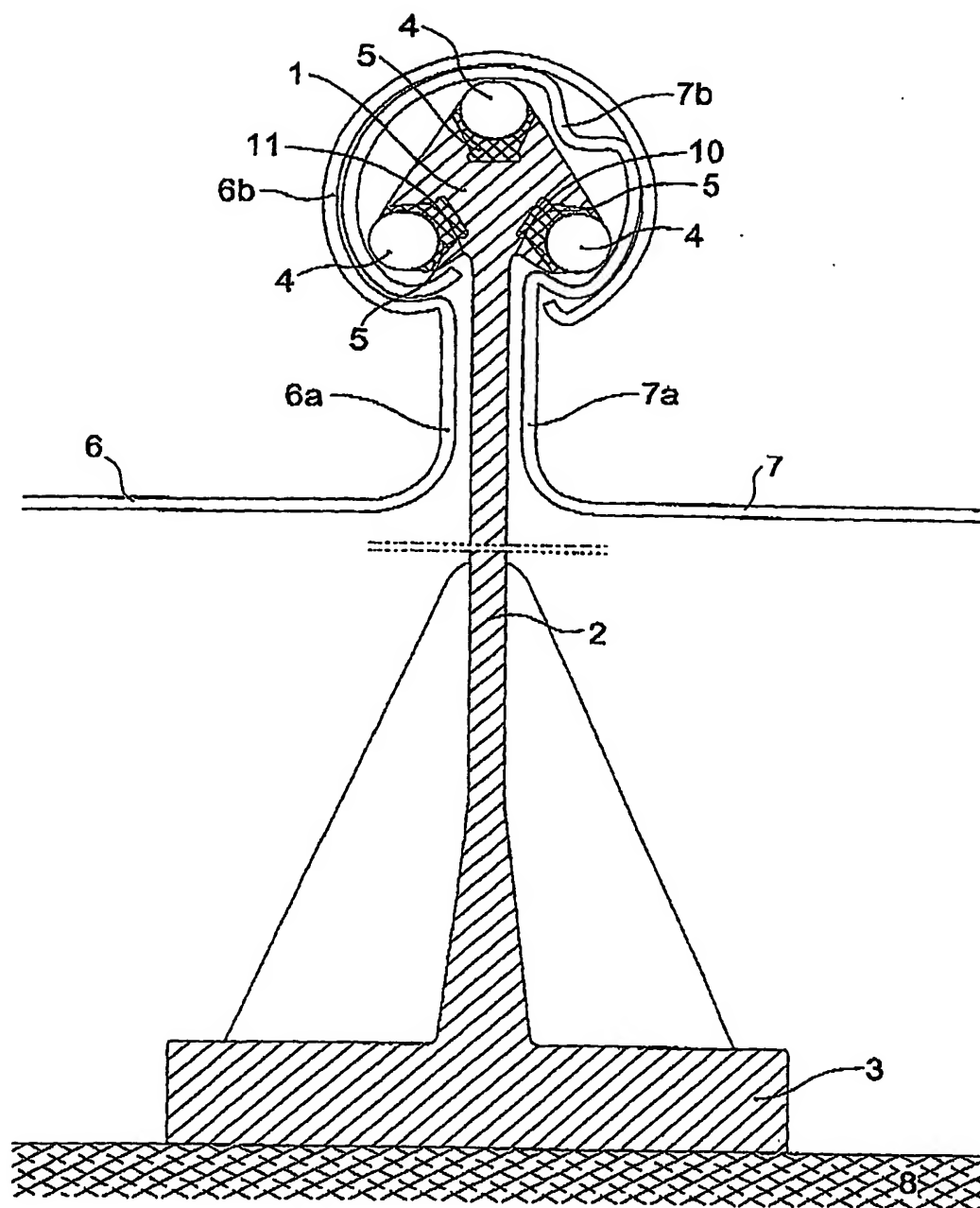


FIG. 4

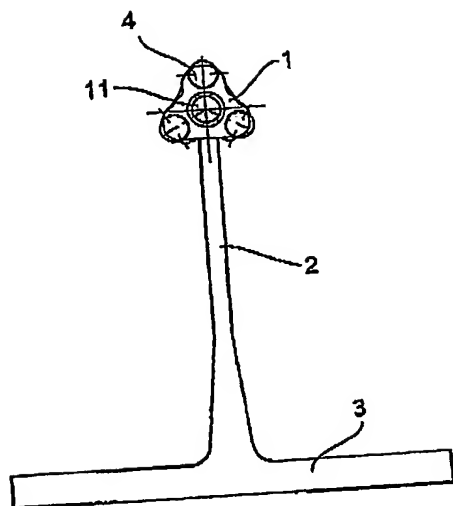


Fig. 5A

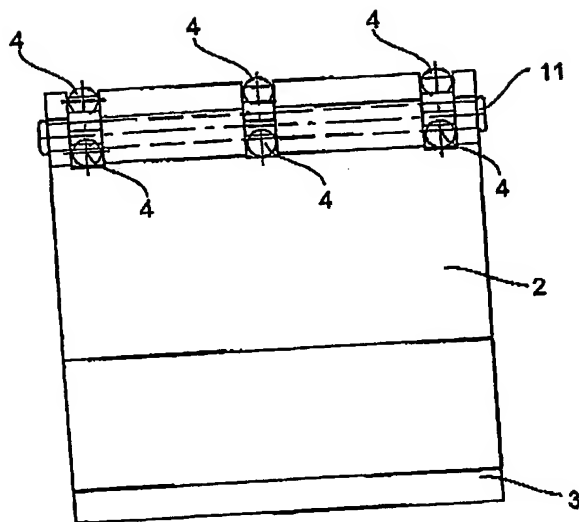


Fig. 5B

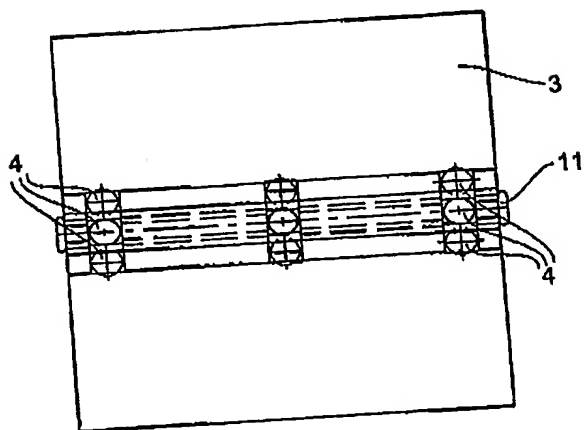


Fig. 5C

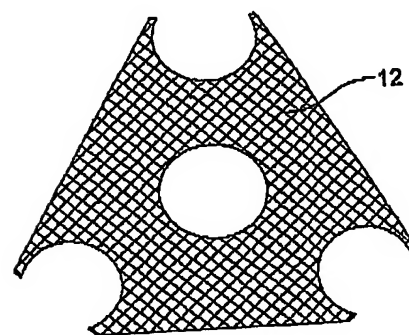


Fig. 6

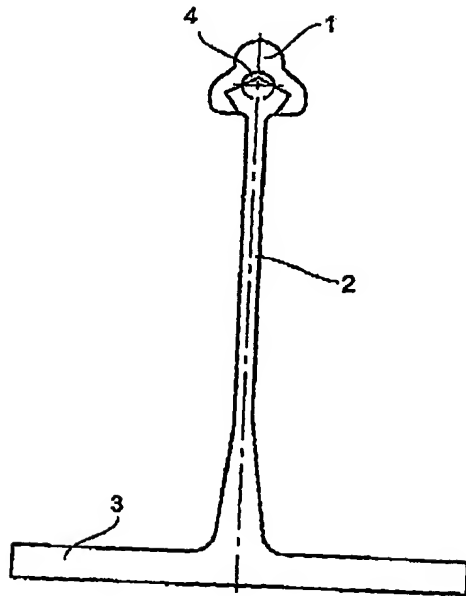


Fig. 7A

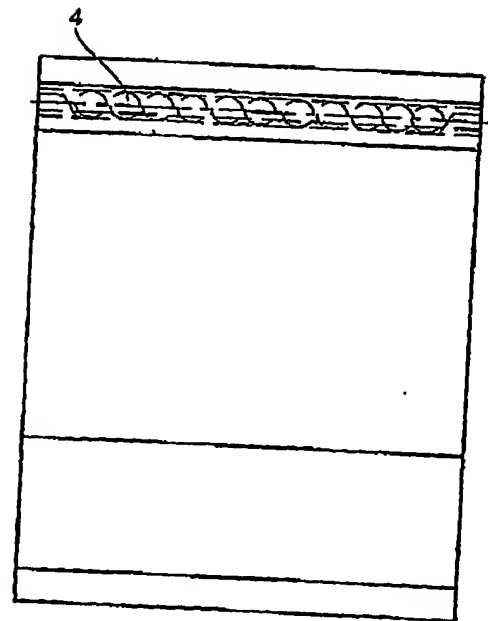


Fig. 7B

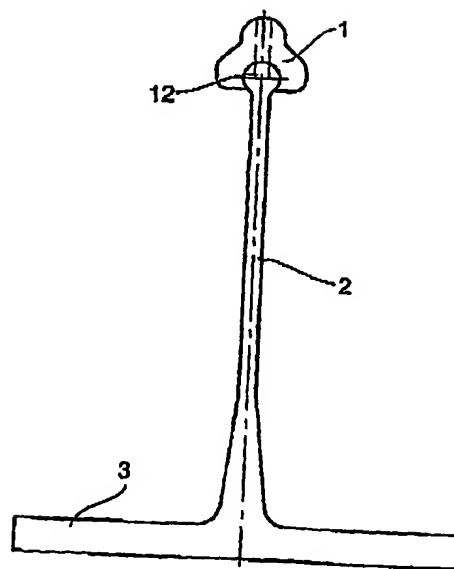


Fig. 8

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